A Systems Approach on Social Enterprise
A workshop towards Multiple Perspective Learning

David Ing
Trito Innovation CoLab
http://coevolving.com

Agents of Change program
July 11, 2018
Centre for Social Innovation
Toronto, Ontario

Image CC-BY-SA: Celina Laurette (2017) Escaping from Plato’s Cave

David Ing, 2018
A social enterprise is an organization that uses business strategies to maximize its social or environmental impact.

The Systems Approach … and its Enemies

… the systems approach belongs to a whole class of approaches to managing and planning our human affairs with the intent that we as a living species conduct ourselves properly in this world. [p. 7]

… these enemies provide a powerful way of learning about the systems approach, precisely because they enable the rational mind to step outside itself and to observe itself [p. 24]


Agenda

A. Outline + introductions

B. Learning-by-trying (in a timebox):
   Multiple Perspectives Learning

C. Continuing our learning
   Appendix
David Ing, 2018

IBM Canada / North America
(1985-2012; retired early)
Management consultant; market development; marketing scientist

Aalto U.
(2003-)
2010-2016, teaching in master's program in Creative Sustainability

U. of Toronto
Canadian Centre for Marketing Information Technologies (C²MIT)
(cofounder 1990-1992)

International Society for the Systems Sciences
(President 2011-2012)
View the book launch slides

The book launch on February 21, 2018, was coordinated with the monthly Systems Thinking Ontario meeting at OCAD University. The event was promoted on Eventbrite.

Watch the book launch video playlist

The presentation slides (including source files) are available on the Coevolving Commons.

Get the book


Open Access

E-reader (Kindle)
mobi eBook (2018), ISBN 978-1-7751672-3-5, ASN B07FR9MN177 in Canada for $0.99CAD, in the USA for $0.79USD, in the UK for £0.99, in Japan for ¥99, in India for €4.99, and shareable via Kindle Book Lending.

Open Access
A4 PDF eBook (2017), ISBN 978-1-7751672-0-4, DOI: 10.20850/9781775167204 at the Glasstree Shop, free of charge with log in


The canonical version of the book is now the eBook version. The text and diagrams are easier to read on a tablet than the A4 PDF. This version embeds tables and scalable vector graphics (SVG), which may not be rendered perfectly on all devices.

- On a desktop computer, ...
  - Kobo Desktop App renders perfectly on MacOS and Windows,

An outline of the event is described on the Coevolving Innovations blog.
This workshop contributes towards open sourcing research

<table>
<thead>
<tr>
<th>Research</th>
<th>Consulting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many-to-many</td>
<td>One-to-one</td>
</tr>
<tr>
<td>Pooled knowledge community</td>
<td>Focused bandwidth</td>
</tr>
<tr>
<td>Open sourcing</td>
<td>Private sourcing</td>
</tr>
<tr>
<td>Creative Commons licensing</td>
<td>Trade secrets, copyrights</td>
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<tr>
<td>Free (as in liberty)</td>
<td>Privileged (permissioned)</td>
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<tr>
<td>Non-exclusionary</td>
<td>Negotiated conditions</td>
</tr>
<tr>
<td>Free (as in gratis)</td>
<td>Fee (for consideration)</td>
</tr>
<tr>
<td>Shared investment</td>
<td>Gradient in value</td>
</tr>
</tbody>
</table>

- **Research**
  - Many-to-many: Pooled knowledge community
  - Open sourcing: Creative Commons licensing
  - Free (as in liberty): Non-exclusionary
  - Free (as in gratis): Shared investment

- **Consulting**
  - One-to-one: Focused bandwidth
  - Private sourcing: Trade secrets, copyrights
  - Privileged (permissioned): Negotiated conditions
  - Fee (for consideration): Gradient in value
Workshop participants self-introductions

Who … is your organization?

… are the members here, today?

Why … will the world value your organization’s contribution?

What … do you need to learn over the next 3 months to be successful?
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5. Offerings, value constellations, co-responding

C. Continuing our learning

Appendix
With known knowns in science eroding by systemic world changes, collective learning on why, how + when-where-whom gains value

<table>
<thead>
<tr>
<th>Colloquial description:</th>
<th>Learning why</th>
<th>Learning how</th>
<th>Learning when, learning where, learning whom</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pursuits:</strong></td>
<td>Uncovering universal truths</td>
<td>Instrumental rationality towards a conscious goal</td>
<td>Values in practice based on judgement and experience</td>
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<tr>
<td><strong>Primary intellectual virtue:</strong></td>
<td><strong>Episteme</strong></td>
<td><strong>Techne</strong></td>
<td><strong>Phronesis</strong></td>
</tr>
<tr>
<td><strong>Translation / interpretation:</strong></td>
<td>Science (viz. epistemology)</td>
<td>Craft (viz. technique)</td>
<td>Prudence, common sense</td>
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<tr>
<td><strong>Type of virtue:</strong></td>
<td>Analytic scientific knowledge</td>
<td>Technical knowledge</td>
<td>Practical ethics</td>
</tr>
<tr>
<td><strong>Orientation:</strong></td>
<td>Research</td>
<td>Production</td>
<td>Action</td>
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<tr>
<td><strong>Nature:</strong></td>
<td>Universal</td>
<td>Pragmatic</td>
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<td><strong>Invariable (in time and space)</strong></td>
<td>Variable (in time and space)</td>
<td>Variable (in time and space)</td>
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<td><strong>Context-independent</strong></td>
<td>Context-dependent</td>
<td>Context-dependent</td>
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</table>


In transdisciplinary work, change may lead scientific narratives to be more robust than models.

In a [scientific] narrative, a series of dynamic happenings are transformed into rate-independent events.

Narratives in science are not about the verity of facts, but are explicitly about what the narrator considers important. The storyteller says which part of the infinitely rich dynamics of full material change is worthy of becoming a named event. Narratives are ordered according to the preferences of the narrator, and account for experience and relationships in explicitly subjective terms.

Narratives help us make up our minds. Context gives meaning. An earlier part of the story can create a context for a later part of the story, thus changing the meaning of that latter part from what it would have been in isolation. In this way, narrative tracks events as they unfold, and so reflect a process of the world becoming.

Narrative gives a point of view. In narratives, there is often tension between the focal attention at a point in the story and the tacit attention of the context to that point ...

Narratives need not be internally consistent, in the way that models should be. This makes narratives more robust than models, because they are still in business when things change to the point of contradiction.

In scientific narrative, there may be multiple causalities, without the narrative failing. The power of narratives is in their ability to make experience commensurate for those who tell and hear the tale. Narratives do this by working on how the various parties feel about the issue at hand.

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C. Continuing our learning

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5. Offerings, value constellations, co-responding
Let’s create a narrative about a dockless bike-sharing system (for Toronto)
Meet Mobike, a billion-dollar bike-sharing startup from China

Jon Russell @jcprussell / Jul 12, 2017

During our recent TechCrunch China event in Shenzhen last month, we took time out to get to know Mobike, one of the leading bike on-demand companies, and sample the bikes it offers.

The company was founded in 2015, and today it claims over 100 million registered users across more than 100 cities, almost all of which are in China.
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In 1969, problem seeking was architectural programming, and problem solving was design.

Programming is a specialized and often misunderstood term. It is "a statement of an architectural problem and the requirements to be met in offering a solution. While the term is used with other descriptive adjectives such as computer programming, educational programming, functional programming, etc., in this report, programming is used to refer only to architectural programming.

Why programming? The client has a project with many unidentified sub-problems. The architect must define the client's total problem.

Design is problem solving; programming is problem seeking. The end of the programming process is a statement of the total problem; such a statement is the element that joins programming and design. The "total problem" then serves to point up constituent problems, in terms of four considerations, those of form, function, economy and time.

The aim of the programming is to provide a sound basis for effective design. The State of the Problem represents the essence and the uniqueness of the project. Furthermore, it suggests the solution to the problem by defining the main issues and giving direction to the designer (Pena and Focke 1969, 3).
Architecting and designing? Landscape and taskscape?

As a noun, design is the named (although sometimes unnamable) structure or behavior of an system whose presence resolves or contributes to the resolution of a force or forces on that system. […]

As a verb, design is the activity of making such decisions. Given a large set of forces, a relatively malleable set of materials, and a large landscape upon which to play, the resulting decision space may be large and complex. […]

All architecture is design but not all design is architecture.


Architectural thinking as shaping the structure of the environment …

The landscape is not ‘space’.

… the landscape is the world as it is known to those who dwell therein, who inhabit its places and journey along the paths connecting them.

[Temporality] is not chronology … and it is not history …. I shall adopt the term ‘task’, defined as any practical operation, carried out by a skilled agent in an environment, as part of his or her normal business of life.

It is to the entire ensemble of tasks, in their mutual interlocking, that I refer by the concept of taskscape.

Design thinking as divergent steps (i.e. creating choices) and convergent steps (i.e. making choices)

**Systems architecting** as an ecological perspective, is a landscape-timescape on which **systems designing** builds.
[In the 1950] psychophysics of perception … "givens" in the light to the eye could not support perceptual phenomena, but only elementary experiences such as sensations. […] Succinctly put, the psycho-physical program was … traditional in considering perception to be a set of responses to presented stimuli (albeit "higher order" stimuli).

Over the last 10-15 years [James J. Gibson] has tried to develop enough theory … to demonstrate that direct perception is indeed plausible even if hordes of difficult details remain to be worked out. The … analysis of the optic array, stimulus organization, and the functional organization of perceptual systems are what Gibson oftens points to as radical features ….

Designing involves change as *adapting*; architecting involves change as *transforming*.

<table>
<thead>
<tr>
<th>Time t0</th>
<th>Time t1</th>
<th>Time t2</th>
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<tbody>
<tr>
<td><strong>Systems Architecting</strong> (via an Ecological Perspective)</td>
<td><strong>Trito-learning</strong> (Transforming, genotypic change)</td>
<td><strong>Deutero-learning</strong> (Adapting, phenotypic change)</td>
</tr>
<tr>
<td>When?</td>
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<td>When not?</td>
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<thead>
<tr>
<th>Generating</th>
<th>Deutero-learning (Adapting, phenotypic change)</th>
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<tr>
<td>When?</td>
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<td>Where not?</td>
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</table>
Trito Learning rolls with turbulent contexts by negotiating in worlds where proto-learning and deutero-learning break down

<table>
<thead>
<tr>
<th>Learning Level</th>
<th>Description</th>
<th>Example / Metaphor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proto-learning</strong> (Learning 1)</td>
<td>Change in response correcting errors within a set of alternatives</td>
<td>Training on food service handling for consistency and safety (e.g. cafeteria kitchens)</td>
</tr>
<tr>
<td><strong>Deutero-learning</strong> (Learning 2)</td>
<td>Change in response correcting the set of alternatives</td>
<td>Mastering a range of food prep traditions (e.g. Culinary Institute of America)</td>
</tr>
<tr>
<td><strong>Trito-learning</strong> (Learning 3)</td>
<td>Change in response correcting for contexts (i.e. systems of sets of alternatives)</td>
<td>Competing on tv cooking challenges as teams and individuals (e.g. Hell's Kitchen)</td>
</tr>
</tbody>
</table>

Process discriminating context change over time

When change overwhelms a system design, transcontextualizing may call for re-architecting.
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A system is a whole that cannot be divided into independent parts

(1) Every part of a system has properties that it loses when separated from the system.

(2) Every system has some properties – its essential ones – that none of its parts do.

An environment of a system consists of all variables which can affect the system’s state

1. The state of a system at a moment in time is the set of relevant properties which the system has at that time.

2. An environment of a system is a set of elements and their relevant properties, which elements are not part of the system, but a change in any of which can produce a change in the state of the system.

3. External elements which affect irrelevant properties of a system are not part of its environment.

4. Field centers on the environment in which the subject organization is embedded and which is partially creates.

---


A system can contain subsystems or components

A system can be contained by multiple suprasystems
Human organs as *parts* by western physicians contrast to the *subsystems* of Traditional Chinese Medicine


Traditional Chinese Medicine World Foundation, “Classification of things according to the theory of the five elements”, at https://www.tcmworld.org/what-is-tcm/the-five-major-organ-systems/
Systems thinking is a perspective on parts, wholes, and their relations.

Function is a “contribution of the part to the whole.”

Structure is an “arrangement in space.”

Process is an “arrangement in time.”

Behaviour is a “system change which initiates other events.”


In authentic systems thinking, synthesis precedes analysis and the containing whole is appreciated.

1. Identify a containing whole (system) of which the thing to be explained is a part.
2. Explain the behavior or properties of the containing whole.
3. Then explain the behavior or properties of the thing to be explained in terms of its role(s) or function(s) within its containing whole.

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A Systems Approach on Social Enterprise
An organizational architecture positions for product change and process change as dynamic or static

Figure 1: Product-process change matrix


Figure 9
Making the transformation: The wrong path

Figure 10
Making the transformation: The right path
Voices that are heard (or not heard) is the concern of critical systems heuristics, with observations and evaluations considered relevant or not.

<table>
<thead>
<tr>
<th>Boundary conditions</th>
<th>Boundary issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Client</td>
<td>Sources of motivation</td>
</tr>
<tr>
<td>2. Purpose</td>
<td>Sources of power</td>
</tr>
<tr>
<td>3. Measure of improvement</td>
<td>Those involved</td>
</tr>
<tr>
<td>4. Decision-maker</td>
<td>Sources of knowledge</td>
</tr>
<tr>
<td>5. Resources</td>
<td>Those involved</td>
</tr>
<tr>
<td>6. Decision environment</td>
<td>Those affected</td>
</tr>
<tr>
<td>7. Professional</td>
<td></td>
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<tr>
<td>8. Expertise</td>
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<tr>
<td>9. Guarantee</td>
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<tr>
<td>10. Witness</td>
<td></td>
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<tr>
<td>11. Emancipation</td>
<td></td>
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<tr>
<td>12. World view</td>
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</tbody>
</table>

The reference system (system of concern) that determines what observations (“facts”) and evaluations (“values”) are considered relevant when it comes to assessing the merits or defects of a proposition.

Affordances are relational in an ecological perspective

The term *affordance* refers to whatever it is about the environment that contributes to the kind of *interaction* that occurs. […]

An affordance relates attributes of something in the environment to an interactive activity by an agent who has some ability, and an ability relates attributes of an agent to an interactive activity with something in the environment that has some affordance.

The relativity of affordances and abilities is fundamental. Neither an affordance nor an ability is specifiable in the absence of specifying the other.

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Offering Designing (Being)
When: ?
When not: ?
Where: ?
Where not?

Offering Designing (Becoming)
When: ?
When not: ?
Where: ?
Where not?
An offering can be an output, an input or a co-creation

**Offerings-output production**
- Providers fix bundles of offerings from which customers select

**Offerings-input coproduction**
- Customers broaden the range of options through loose coupling

**Value-elevating co-creation**
- Providers and customer mutually experience, and then improve


Theory of the offering sees coproduction with *input*, or *output*

Rafael Ramirez and Johan Wallin. *Prime Movers: Define Your Business or Have Someone Define It Against You*, 2000, p. 141.
The theory of firms on “adding value” has turned to mobilizing interactive value constellations

Our traditional about value … [says] every company occupies a position on the value chain. Upstream, suppliers provide inputs. The company then adds values to these inputs, before passing them downstream to then next actor in the chain [whether another business or the final consumer].

... IKEA’s strategic intent [is] to understand how customers can create their own value and create a business system that allows them to do it better. IKEA’s goal is not to relieve customers of doing certain things but to mobilize them to do easily certain things they have never done before. Put another way, IKEA invents value by enabling customers' own value-creating activities. ... Wealth is [the ability] to realize your own ideas.
Lifelines co-respond with habit, agencing, and attentionality

Habit, rather than volition:
I become my walking, and that my walking walks me. I am there, inside of it, animated by its rhythm. And with every step I am not so much changed as modified, in the sense not of transition from one state to another but of perpetual renewal. [p. 16]


Images from Flickr: "Sandy walks on sunny evenings" CC-BY 2010 Satish Krishnamurthy; "Jump Together" CC-BY 2011 Stephanie Evanoff; "IMG 2012" CC-BY 2013 Ondrej Tachovsky

Agencing, rather than agency:
Interaction goes back and forth as agents, facing each other on opposite banks of the river, trade messages, missiles, and merchandise. But to correspond, in my terms, is to join with the swimmer in the midstream. It is a matter not of taking sides but of going along. [p. 18]

Attentionality, rather than intentionality:
Walking calls for the pedestrian's continual responsiveness to the terrain, the path, and the elements. To respond, he must attend to these things as he goes along, joining or participating with them in his own movements. [p. 19]
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Some books: dynamic stability; offerings and value constellation
Lacking history to study organizational learning circa 1995, videos and a book explored *How Buildings Learn*.
Pacing layers emphasize coevolution and learning

**SITE**
This is the geographical setting, the urban location, and the legally defined lot, whose boundaries outlast generations of ephemeral buildings. "Site is eternal", Duffy agrees.

**STRUCTURE**
The foundation and load-bearing elements are perilous and expensive to change, so people don't. These are the building. Structural life ranges from 30 to 300 years (but few buildings make it past 60, for other reasons).

**SKIN**
Exterior surfaces now change every 20 years or so, to keep up with fashion or technology, or for wholesale repair. Recent focus on energy costs has led to re-engineered Skins that are air-tight and better-insulated.

**SERVICES**
These are the working guts of a building: communications wiring, electrical wiring, plumbing, sprinkler system, HVAC (heating, ventilation, and air conditioning), and moving parts like elevators and escalators. They wear out or obsolesce every 7 to 15 years. Many buildings are demolished early if their outdated systems are too deeply embedded to replace easily.

**SPACE PLAN**
The interior layout, where walls, ceilings, floors, and doors go. Turbulent commercial space can change every 3 years; exceptionally quiet homes might wait 30 years.

**STUFF**
Chairs, desks, phones, pictures; kitchen appliances, lamps, hair brushes; all the things that twitch around daily to monthly. Furniture is called mobilia in Italian for good reason.

Systems Thinking Ontario is an interdisciplinary group centered in Southern Ontario, with the premise that members might be within driving distance of Toronto, and might meet face-to-face. Think global, act local!


Our working definition of systems thinking is: understanding the world by exploring parts and wholes. We do this by simultaneously and iteratively using analysis (what parts does this whole contain) and synthesis (which wholes contain this part). For an opinion (not necessarily definitive) of the domain of interest, see "An Interview on Service Systems, Natural Systems", and systems sciences.

Upcoming meetings are listed in the sidebar navigation along with links to past meetings.

Some related local activities on Systems Thinking include:

- The Strongly Sustainable Business Model Group, in the OCADU Strategic Innovation Lab (connected with the Strategic Foresight and Innovation program)
- The Faculty of Environmental Studies, at York University; and
- The Sustainability Management program, in the G. Raymond Chang School of Continuing Education at Ryerson University.

Systems Thinking Ontario could become a chapter of the International Society for the Systems Sciences ... if the members decided that the group should do that. The most recent meeting of the ISSS in Ontario was at Waterloo 2010, preceded by Toronto 2000.


Systems Thinking Ontario is a spin-off from the Design With Dialogue community. The spirit of collaboration and open sharing aspires to the be same. The format and audience may be a little different.
<table>
<thead>
<tr>
<th>Publication Date</th>
<th>Publication Title</th>
<th>Author(s)</th>
<th>Form</th>
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<tbody>
<tr>
<td>July 2018</td>
<td>“A Systems Approach on Social Enterprise”</td>
<td>David Ing</td>
<td>workshop for the Agents of Change accelerator program, Centre for Social Innovation, Toronto, Ontario</td>
</tr>
<tr>
<td>May 2018</td>
<td>“Evolving Pattern Language towards an Affordance Language”</td>
<td>David Ing</td>
<td>presentation at IBM Research Almaden, San Jose, California</td>
</tr>
<tr>
<td>April 2018</td>
<td>“Innovation Learning for Sustainability: What is smarter for urban systems?”</td>
<td>David Ing</td>
<td>keynote presentation at International Conference on Smart Cities and Urban Design (SCUD 2018), Wuhan, PR China</td>
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<tr>
<td>March 2018</td>
<td>“Architecting for Wicked Messes: Towards an affordance language for service systems”</td>
<td>David Ing</td>
<td>lecture at Master of Design in Strategic Foresight and Innovation, OCADU, Toronto</td>
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Recent content
- 2012/03/14 11:30 Beth Bechky, “Advocates for the evidence: Forensic science as boundary work” UCDavis, Rotman OBHR Speaker Series 2 hours 18 minutes ago
- 2011/10/24 17:30 Ron Burt, “How Do Social Networks Create Competitive Advantage?”, S. D. Clark Memorial Lecture, University of Toronto
If they can get you asking the wrong questions, they don’t have to worry about answers  
(Thomas Pynchon)

<table>
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<th>Error Description</th>
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</tr>
<tr>
<td>2</td>
<td><strong>False negative:</strong> missing a (statistical) relation that is real</td>
</tr>
<tr>
<td>3</td>
<td><strong>Tricking ourselves:</strong> Unintentional error of solving wrong problems precisely</td>
</tr>
<tr>
<td></td>
<td>(through ignorance, faulty education or unreflective practice)</td>
</tr>
<tr>
<td>4</td>
<td><strong>Tricking others:</strong> Intentional error of solving wrong problems</td>
</tr>
<tr>
<td></td>
<td>(through malice, ideology, overzealousness, self-righteousness, wrongdoing)</td>
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The kinds of problems that planners deal with -- societal problems -- are inherently different from the problems that scientists and perhaps some classes of engineers deal with.

**Planning problems are inherently wicked.**

The problems that scientists and engineers have usually focused upon are mostly "tame" or "benign" ones.

As an example, consider a problem of mathematics, such as solving an equation; or the task of an organic chemist in analyzing the structure of some unknown compound; or that of the chessplayer attempting to accomplish checkmate in five moves.

For each the mission is clear.

It is clear, in turn, whether or not the problems have been solved.

There are at least ten distinguishing properties of planning-type problems, i.e. wicked ones ... We use the term “wicked” in a meaning akin to that of “malignant” (in contrast to “benign”) or “vicious” (like a circle) or “tricky” (like a leprechaun) or “aggressive” (like a lion, in contrast to the docility of a lamb).

### Ten distinguishing properties of planning-type (wicked) problems (#1 - #5)

<table>
<thead>
<tr>
<th><strong>Tame (benign) problems</strong></th>
<th><strong>Wicked (malignant) problems</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. An <em>exhaustive formulation</em> can be stated containing all the information needed for understanding and solving the problem</td>
<td>There is <em>no definitive formulation</em> of a wicked problem.</td>
</tr>
<tr>
<td>2. There are <em>criteria</em> that tell when <em>the</em> or <em>a solution has been found</em>.</td>
<td>Wicked problems have <em>no stopping rule</em>.</td>
</tr>
<tr>
<td>3. There are conventionalized <em>criteria for objectively deciding</em> whether the offered solution is correct or false.</td>
<td>Solutions to wicked problems are not true-or-false, but <em>good or bad</em>.</td>
</tr>
<tr>
<td>4. One can determine on the spot <em>how good a solution-attempt</em> has been.</td>
<td>There is no immediate and <em>no ultimate test</em> of a solution to a wicked problem.</td>
</tr>
<tr>
<td>5. The problem-solver can try various <em>experimental runs</em> without penalty.</td>
<td>Every solution to a wicked problem is a &quot;<em>one-shot operation</em>&quot;; because there is no opportunity to learn by trial and error, every attempt counts significantly.</td>
</tr>
</tbody>
</table>
Ten distinguishing properties of planning-type (wicked) problems (#6 - #10)

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<tbody>
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<td><strong>6.</strong> There are criteria which enable proof that all solutions have been identified and considered.</td>
<td>Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described.</td>
</tr>
<tr>
<td><strong>7.</strong> There might be important classes to know which type of solution to apply.</td>
<td>Every wicked problem is essentially unique.</td>
</tr>
<tr>
<td><strong>8.</strong> Small steps lead to overall improvement, through incrementalism.</td>
<td>Every wicked problem can be considered to be a symptom of another problem.</td>
</tr>
<tr>
<td><strong>9.</strong> Rules or procedures can determine the “correct” explanation or combination of them.</td>
<td>The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.</td>
</tr>
<tr>
<td><strong>10.</strong> Science does not blame for postulating hypotheses that are later refuted.</td>
<td>The social planner has no right to be wrong (i.e., planners are liable for the consequences of the actions they generate).</td>
</tr>
</tbody>
</table>
A *mess* (or *problématique*) is a system of problems

The *optimal solution* of a model is not an optimal solution of a problem unless the model is a *perfect representation* of the problem. Therefore, in testing a model and evaluating solutions derived from it, the model itself should not be used to determine the relevant comparative performance measures.

All *models* are *simplifications of reality*. If this were not the case, their *usefulness* would be diminished. Therefore, it is critical to determine how well they represent reality.

... what the French call a *problématique* and I call a *mess* ... is a complex and highly dynamic system of interacting problems.

Problems are elements abstracted from messes; therefore, problems are to messes what atoms are to planets. There is an important systems principle, familiar to all of you, that applies to messes and problems: that the *sum of the optimal solutions to each component problem considered separately is not an optimal solution to the mess*. This follows from the fact that the behavior of the mess depends more on how the solutions to its component problems interact than on how they act independently of each other.

The treatment of messes requires *more than problem solving*; it requires planning. Planning should consist of the design of a desirable future and invention or selection of ways of getting there. Therefore, it is *more* a matter of *synthesis*, of *design* and *invention* than it is of analysis, of programming and budgeting.

Complicated systems are rare; complex systems are the norm

The following is possibly the golden rule for distinguishing ‘complex’ from ‘complicated’ problems and systems.

**Complicated problems**
- originate from **causes** that can be individually distinguished;
- they can be addressed piece-by-piece;
- for each input to the system there is a proportionate output;
- the relevant systems can be controlled and the problems they present admit permanent solutions.

... complex problems and systems
- result from networks of **multiple interacting causes** that cannot be individually distinguished;
- must be addressed as entire systems, that is they cannot be addressed in a piecemeal way;
- they are such that **small inputs** may result in disproportionate effects;
- the problems they present **cannot be solved once and for ever**, but require to be systematically managed and typically any intervention merges into new problems as a result of the interventions dealing with them; and the relevant systems cannot be controlled ...

... decision-makers ask their consultants ... to treat complex problems as if they were complicated ones. Complexity and the nature of contemporary science show that the claim to ‘solve’ (complex) problems is often ungrounded. ‘Learning to dance’ with a complex system is definitely different from ‘solving’ the problems arising from it.

## Types of systems can be categorized by purposefulness

<table>
<thead>
<tr>
<th>Systems and models</th>
<th>Parts</th>
<th>Wholes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deterministic</td>
<td>Not purposeful</td>
<td>Not purposeful</td>
</tr>
<tr>
<td>Animated</td>
<td>Not purposeful</td>
<td>Purposeful</td>
</tr>
<tr>
<td>Social</td>
<td>Purposeful</td>
<td>Purposeful</td>
</tr>
<tr>
<td>Ecological</td>
<td>Purposeful</td>
<td>Not purposeful</td>
</tr>
</tbody>
</table>

### Purposive == goal-seeking

- **Goals**: those ends that we can expect to attain within the period covered by planning.

- **Objectives**: those ends that we do not expect to attain within the period planned for but which we hope to attain later, and toward which we believe progress is possible within the period planned for.

### Purposeful == ideal-seeking

- **Ideals**: those ends that are believed to be unattainable but towards which we believe progress is possible during and after the period planned for.

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An inquiring system is a way of knowing for human beings

**Inductive-Consensual IS**: The first way (on *objective* views)

- **guarantor** = agreement (consensus) e.g. Delphi approach

**Analytic-Deductive IS**: The second way (on *objective* views)

- **guarantor** = logical consistency (fact nets) e.g. the “best man” for the job

**Multiple Realities IS**: The third way (on *subjective* views)

- **guarantor** = ability to see range of views (representations) e.g. disciplinary views of drug problem

**Dialectic IS**: The fourth way (on *subjective* views)

- **guarantor** = conflict e.g. challenging assumptions of what skid row housing should be

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55 A Systems Approach on Social Enterprise July 2018

David Ing, 2018
A systems approach sweeps in across 4 modes of knowing

The fifth way of knowing
Systems Approach (with multiple perspectives)
guarantor = progress (sweeping-in process)

C. West Churchman (1913-2004)

John Locke (1632-1704)
Gottfried Wilhelm Leibniz (1646-1712)
Immanuel Kant (1725-1804)
Georg Wilhelm Friedrich Hegel (1770-1831)

“strategy is a pattern – specifically, a pattern in a stream of actions” (Mintzberg 1987)

Intended action ~ realized behaviour

Intended plan
- Deliberate action

Inaction or misguided execution
- Unrealized plans

From or despite preconceived intentions
- Emergent action

Open systems (Emery and Trist), directive correlation (Sommerhoff)

1. **L_{11}** Internal part-part relations
   - **L_{21}** Learning from environment
   - **L_{12}** Planning process

2. **L_{22}** Environment part-part relations

<table>
<thead>
<tr>
<th></th>
<th>( t_0 ) player sees ball</th>
<th>( t_k ) player kicks ball</th>
<th>end</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case (a):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action adapted to ball</td>
<td>Ball_0</td>
<td>Action_k</td>
<td>Goal</td>
</tr>
<tr>
<td>Ball</td>
<td>Ball_k</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Case (b):</strong></td>
<td>Ball is adapted to action</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action_0</td>
<td>Action_k</td>
<td>Ball_k</td>
<td>Goal</td>
</tr>
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<td>Goal</td>
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David Ing, 2018
The Causal Texture of Social Environments – Extended fields of directive correlations (Emery and Trist)

<table>
<thead>
<tr>
<th>Type</th>
<th>Placid</th>
<th>Reactive</th>
</tr>
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<tbody>
<tr>
<td><strong>Type 1. Random</strong></td>
<td>Goals and noxiants randomly distributed. Strategy is tactic. “Grab it if it’s there”. Largely theoretical of micro, design, e.g. concentration camps, conditioning experiments. Nature is not random.</td>
<td>Type 2 with two or more systems of one kind competing for the same resources. Operational planning emerges to outmanoeuvre the competition. Requires extra knowledge of both Ss and E. E is stable so start with a set of givens and concentrate on problem solving for win-lose games. Need to create instruments that are variety-reducing (foolproof) – elements must be standardized and interchangeable. Birth of bureaucratic structures where people are redundant parts. Concentrate power at the top – strategy becomes a power game.</td>
</tr>
<tr>
<td><strong>Type 2. Clustered</strong></td>
<td>Goals and noxiants are lawfully distributed – meaningful learning. Simple strategy – maximize goals, e.g. use fire to produce new grass. Most of human span spent in this form. Hunting, gathering, small village. What people mean by the “good old days”.</td>
<td>Dynamic, not placid/stable. Planned change in type 3 triggers off unexpected social processes. Dynamism arises from the field itself, creating unpredictability and increasing relevant uncertainty and its continuities. Linear planning impossible, e.g. whaling disrupted reproduction, people react to being treated as parts of machine. Birth of open systems thinking, ecology, and catastrophe theory.</td>
</tr>
<tr>
<td><strong>Type 3. Disturbed</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>Type 4. Turbulent</strong></td>
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<td></td>
</tr>
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</table>

Where

\[ O = \text{goals (goodies)}, \quad X = \text{noxiants (baddies)} \]

**Elements to know**

- system
- system, action
- system, action, learning
- system, action, environment
- beauty – includes fitting together naturally

**Ideals**

- Homonomy – sense of belonging
- Nurturance – caring for
- Humanity – in broadest sense

**Forms of learning**

- conditioning
- meaningful
- problem solving
- puzzle-solving

**Forms of planning**

- tactics
- tactics / strategies
- tactics / operational strategies
- active adaptive planning
Agenda

A. Outline + introductions

B. Learning-by-trying (in a timebox):
   Multiple Perspectives Learning

C. Continuing our learning

Appendix

1. An exercise:
   a dockless bike sharing system

2. Architecting, designing, learning

3. Systems basics

4. Dynamic stability (positioning), voices, affording values

5. Offerings, value constellations, co-responding